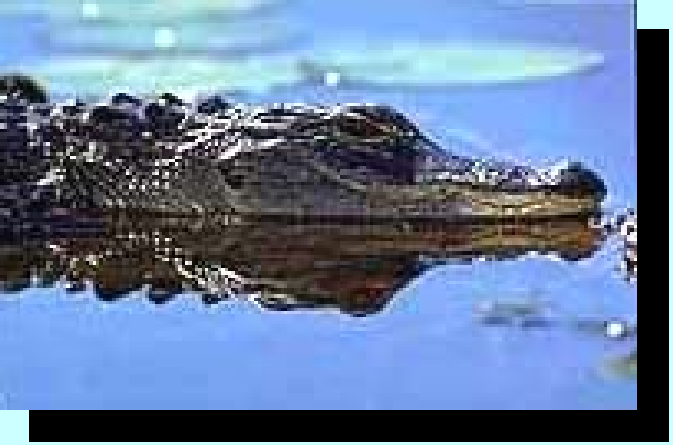


Everglades Protection Area Tributary Basins

Long-Term Plan for Achieving Water Quality Goals

Tracey Piccone, P.E.

March 18, 2004

Background

- 1994 Everglades Forever Act
  - Required the submittal of a permit modification by December 31, 2003 containing a **PLAN** for achieving compliance with phosphorus criterion in the Everglades Protection Area
- Strategy has been in every annual Everglades Consolidated report
- Utilized results of basin-specific feasibility studies

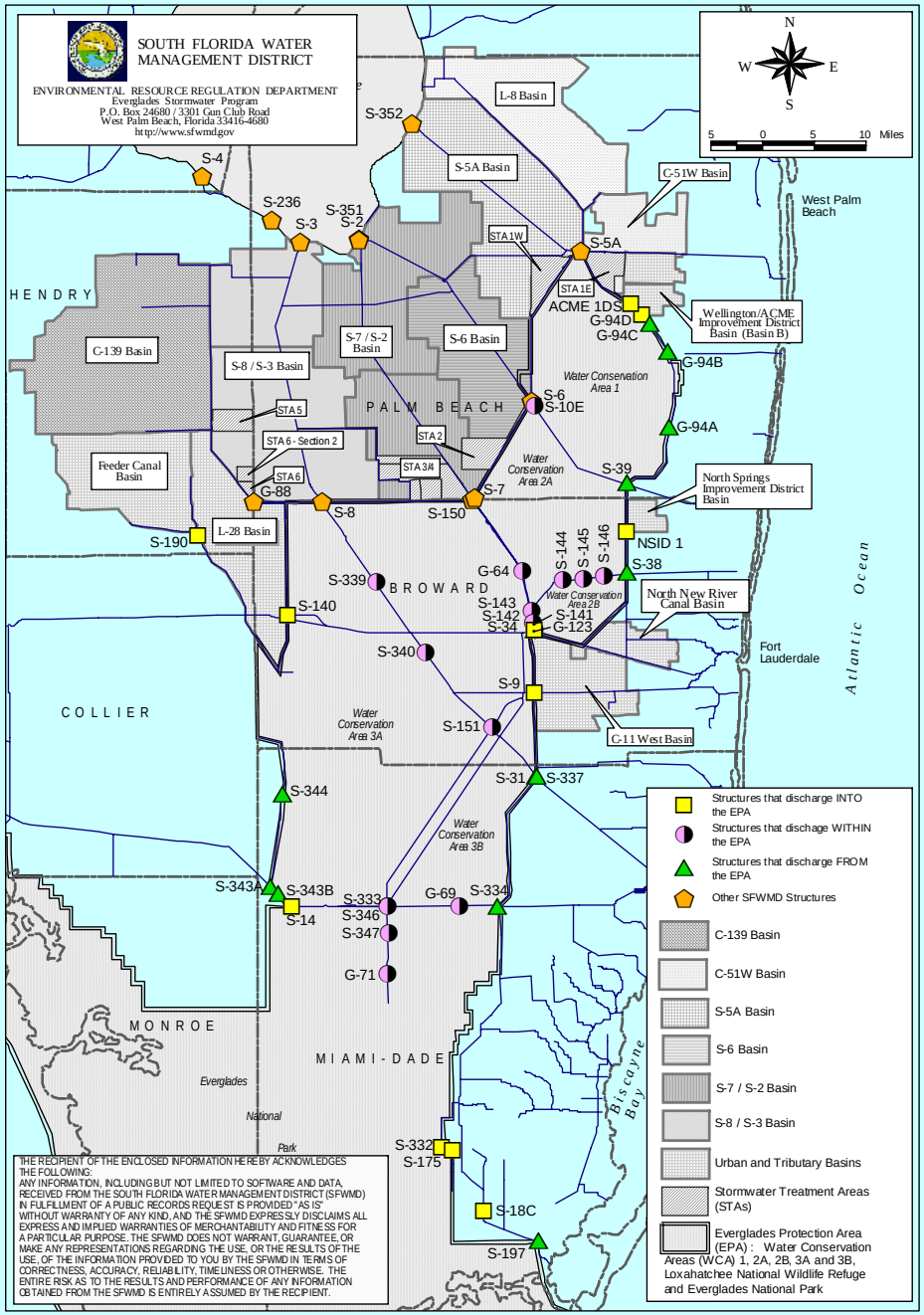
Basic Precepts

- Although existing phosphorus control programs are doing better than expected, additional measures will be needed to achieve compliance with water quality standards
- Substantive scientific uncertainties remain
- Maximum water quality improvement through an adaptive implementation process

Legal Mandates

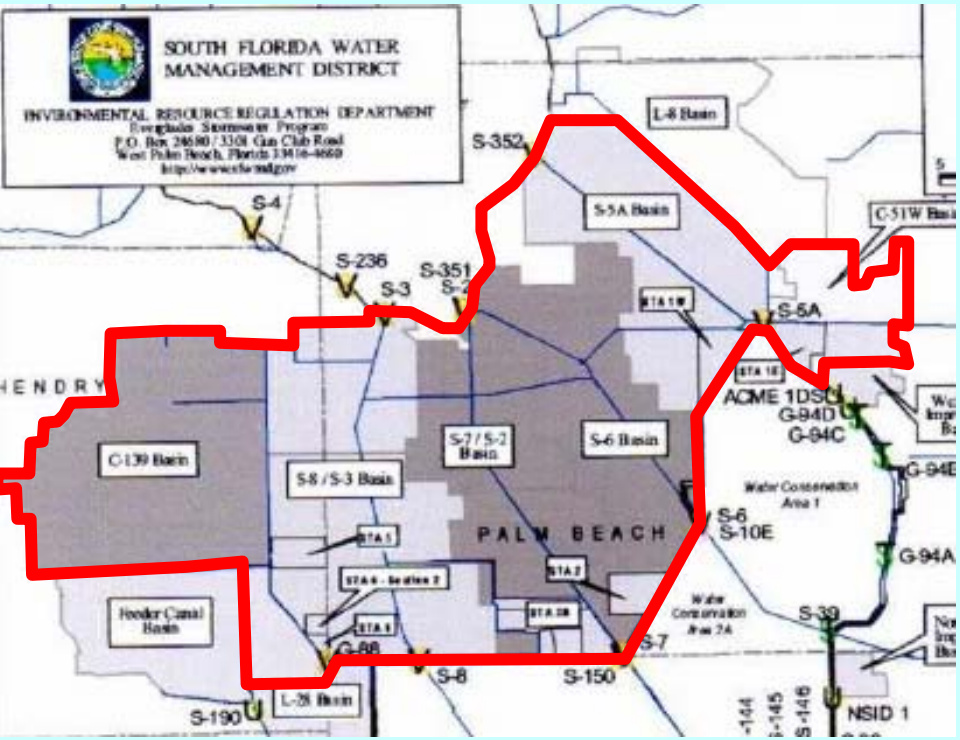
- 2003 amended Everglades Forever Act found that the Plan provides the best available phosphorus reduction technology (BAPRT) to reduce outflow concentrations so as to achieve the criterion in the Everglades
- Florida's Everglades Phosphorus Water Quality Standard also found the Plan accomplishes implementation of BAPRT

Basins Addressed



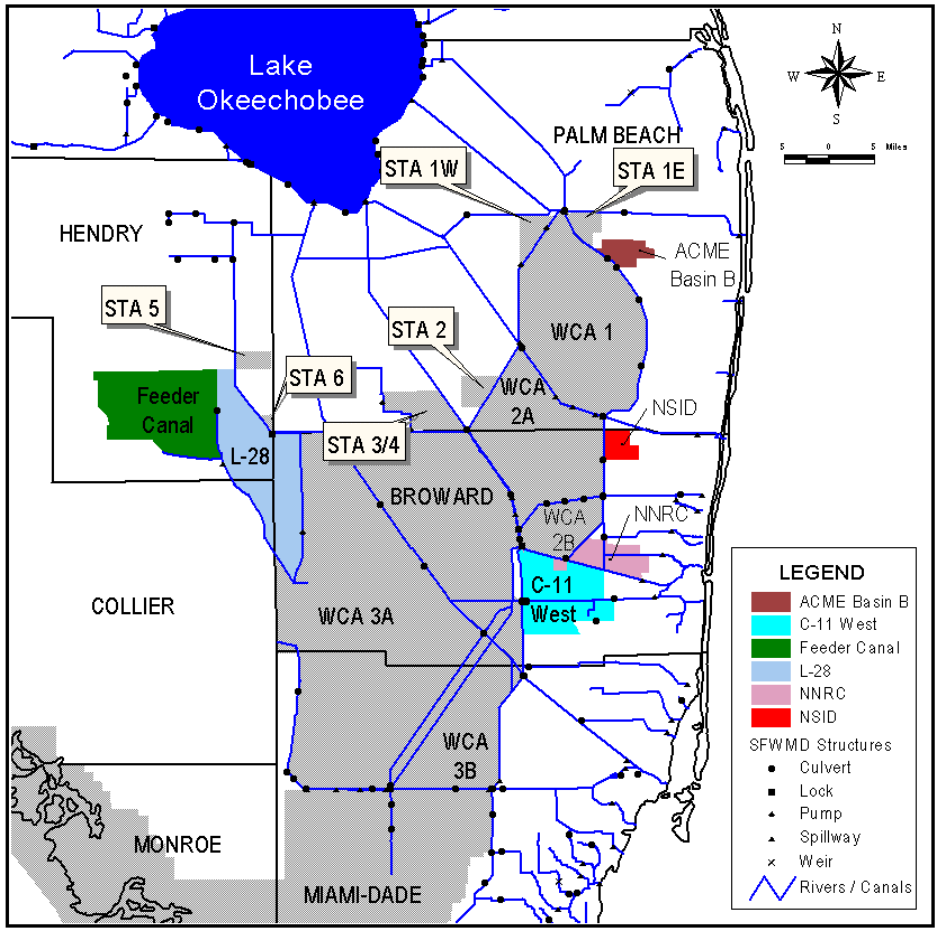
- Seven Everglades Construction Project (ECP) Basins
- Six Everglades Stormwater Program (ESP) Basins

The ECP Basins



- Seven ECP Basins
  - S-5A, S-6, S-7, S-8, C-139 & C-139 Annex, and C-51 West
  - Grouped into six STA-specific areas (STA-1E, STA-1W, STA-2, STA-3/4, STA-5, STA-6)

The ESP Basins



- Six ESP Basins
  - Acme Improvement District, Basin B
  - North Springs Improvement District
  - North New River Canal
  - C-11 West
  - L-28
  - Feeder Canal

Technical Basis

- Primary sources of information used in *Plan* development were the SFWMD's Basin-Specific Feasibility Studies completed in October 2002.
  - For the ECP Basins, prepared by Burns & McDonnell.
  - For the ESP Basins, prepared by Brown & Caldwell

Technical Basis

- Projections of *Plan* performance in reducing TP loads discharged to EPA based on daily simulation of 31-year period, both Pre-CERP and Post-CERP
  - Pre-CERP inflow volumes and TP concentrations taken from SFWMD's May 2001 Baseline Data.
  - Post-CERP hydrologic data taken from supplemental simulation prepared by SFWMD in March 2002.

Technical Basis

- TP concentrations and loads for Post-CERP simulation based on same algorithms and methods as for Pre-CERP
  - In the ECP Basins, it was also necessary to estimate the influence of the EAA Storage Reservoirs Projects on inflow TP concentrations to STAs.

Technical Basis

- In STA-type treatment areas, projections were developed using DMSTA with best available information relative to performance of various vegetative communities
  - Calibrations based on results of published, peer-reviewed reports on a wide variety of research projects

Planning Objective

- All analyses were directed to obtaining a Long-Term Geometric Mean TP Concentration in discharges to the EPA of 10 ppb.
  - Consistent with phosphorus criterion proposed at the time by FDEP
  - Phosphorus criterion finally adopted by ERC varies in detail.

Substantial Uncertainties Remain

- Most Significant Uncertainties-
  - Inflow volumes and TP loads, both now and Post-CERP
  - Variable performance of vegetative communities in STAs - need to continue to improve understanding and reliability of forecasts

Sensitivity Analyses

- Given the substantial uncertainties, the Basin-Specific Feasibility Studies included extensive sensitivity analyses to assess potential range in performance of alternatives considered

Principal Conclusions

- In each basin, a strategy was identified that is capable, within the anticipated range of performance, of meeting the Planning Objective.
- Remaining uncertainties suggest it would be imprudent to fully rely on the strategies identified. Additional future steps may be necessary.

Principal Conclusions

- In the ESP Basins in particular, substantial savings of public monies could result from improved integration of water quality improvement strategies with CERP projects as formulated.
  - BSFS and subsequent analyses suggest savings on the order of $640 million in the ESP basins.
  - Savings result not from modification of CERP projects, but from recognizing their impact on TP loads discharged to the EPA (due to diversion for other beneficial purposes) .

Overall Strategy

- All scientifically defensible steps are taken at earliest achievable dates
- Focused efforts are directed to improving the scientific and technical basis for additional steps
- Incremental implementation of additional steps as soon as their need and utility is confirmed

Basic Precepts

- Substantive scientific uncertainties remain
- Maximum water quality improvement will require an adaptive implementation process

Building Blocks

- Maximize the benefit realized from integration of this effort with CERP
- Operate, maintain and monitor existing and proposed treatment works to maximize their treatment effectiveness
- Take active steps to accelerate the recovery of impacted areas in the EPA

Plan Components

- Three principal plan components
  - Pre-2006 Projects
  - Process Development and Engineering
  - Post-2006 Strategy

Pre-2006 Projects

- Include all structural and operational modifications that can be supported by the current scientific and engineering knowledge base, to be implemented by 12/31/06
  - Structural modification and enhancement of each STA
  - Aggressive operation, maintenance and monitoring of the STAs

Pre-2006 Projects

- In the ECP Basins (STAs)
  - Additional compartmentalization
  - Vegetation management and conversion to more effective communities
  - Operational refinements
- In the ESP Basins
  - Primary reliance on source controls and CERP Projects as formulated and scheduled in the July 2001 CERP master implementation schedule

Pre-2006 Projects ECP Basins

- Possibility that planning objective can be achieved through implementation of pre-2006 projects.
  - Depends heavily on ability to optimize SAV performance; that ability is one principal focus of the Process Development and Engineering component of the Plan

Pre-2006 Projects
ECP Basins

- All complete before 12/31/06
- Total estimated capital cost of $31.5 million*
- Incremental operations and maintenance cost through Fiscal Year 2016 of $20.0 million*
- Total estimated cost for enhancements and modifications of $51.5 million*

*All costs include 3% annual escalation

Projected Performance Varies by STA

- Upon completion of pre-2006 STA enhancements
  - Range of long-term geometric mean TP concentration of 10-15 ppb

Estimated Total Cost, ECP Basins

- Through Fiscal Year 2016,
  - $51.5 million for recommended enhancements and modifications to STAs
  - $150.5 million for maintenance and operation of ECP as presently planned
  - $50.2 million for compliance monitoring
  - $51.2 million for operations monitoring and additional operational support necessary to optimize performance and support the PDE *Plan* component

Recommended Strategy ESP Basins

- Primary reliance on CERP projects
  - In Acme Basin B and L-28 Basins, CERP process to finalize definition of projects
  - In other 4 basins, rely on CERP projects as defined in the “Yellow Book”
- Couple with funding for source control programs and analysis of improved integration; total of $1.9 million through Fiscal Year 2006.

NSID, NNR Canal, and C-11W Basins

- In NSID, NNRC and C-11W, CERP projects are intended to divert water now discharged to the EPA for other beneficial uses
- CERP projects as originally formulated will essentially result in achieving the planning objective
  - *Plan* also includes assistance to local communities for implementing urban source controls, evaluation of possible addition of water quality components to C-11W Basin current project

Acme Basin B

- *Plan* includes further definition of one of the Acme Basin B alternatives considered in the Basin-Specific Feasibility Studies (diversion of Basin B runoff to STA-1E for treatment); additional information and details are provided for consideration by CERP PDT.

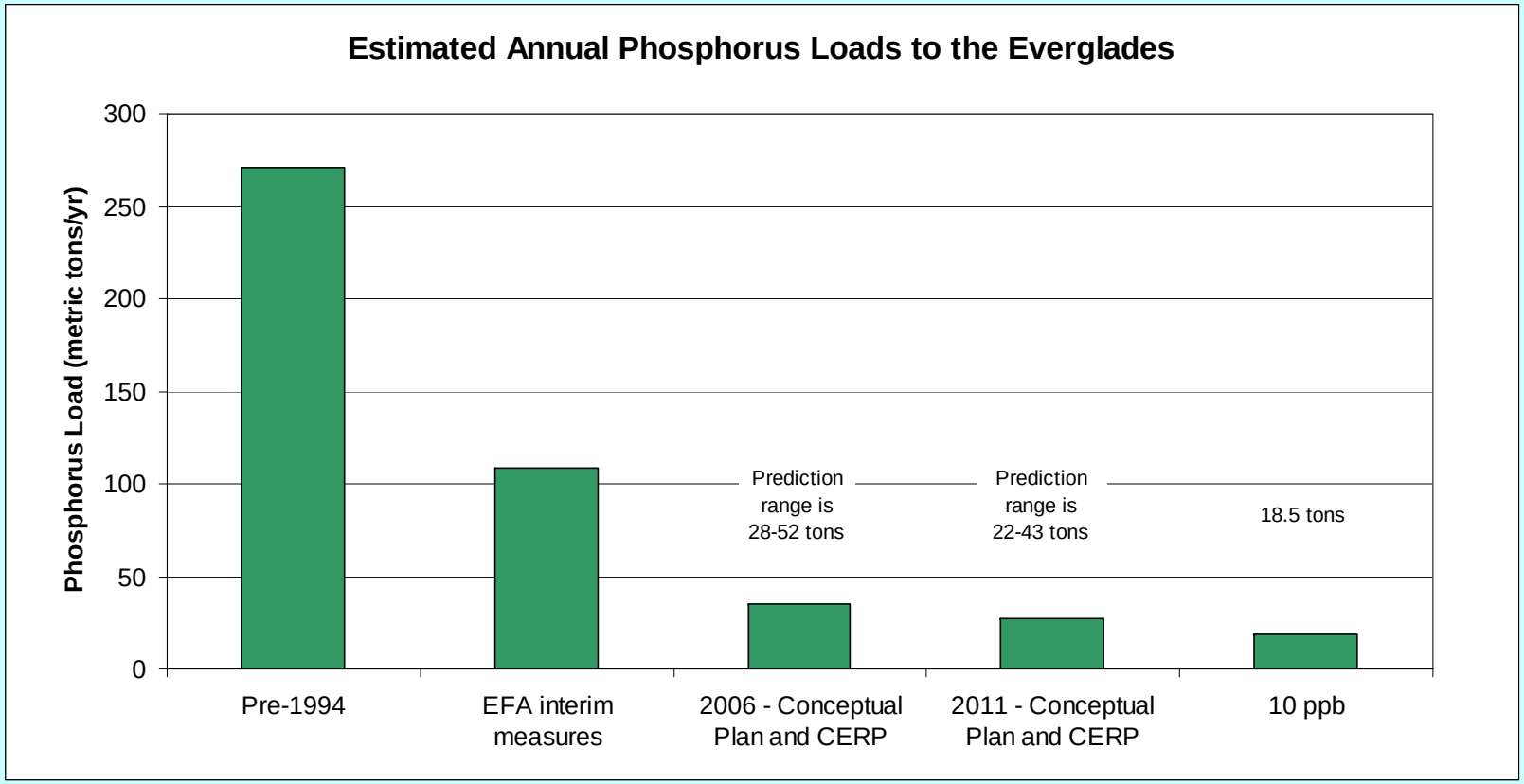
Western Basins

- L-28 Basin and Feeder Canal Basin
  - Additional alternatives were developed as part of the Long-Term Plan for consideration by CERP PDT
  - Accelerated implementation of CERP projects is recommended

Projected Performance in ESP Basins

- Average annual TP load discharged to EPA reduces from 26 metric tons per year to less than 2 metric tons per year by the end of 2010.

Projected Performance



Model projections: almost 90% of water entering Everglades will be 10-15 ppb!

Process Development and Engineering (PDE)

- PDE contains seven primary elements
  - Identify means and methods to replicate the optimal performance of SAV
  - Develop engineering criteria and forecasting tools for additional measures which can be applied within the footprint of existing STAs.
  - Refine estimated impacts of CERP projects on basin discharge volumes and pollutant loads

Process Development and Engineering (PDE)

- Identify opportunities to maintain and improve performance of urban and agricultural source controls
- Enhanced control and monitoring of water quality improvement measures now in place
- Improve the reliability of estimated STA inflow volumes and pollutant loads
- Determine the relationship between quality of water discharged into, and water quality within, the EPA

Process Development and Engineering (PDE)

- PDE will continue through FY 2016
- Total budget of $45 million
- Comprehensive report to Governor and Legislature 12/31/08, presents status of overall effort and recommends further measures

Projected PDE Expenditures Through FY 2016

- Investigate structural modifications - $1.3 million
- BMP investigations - $2.1 million
- Enhanced control and monitoring - $26.5 million
- Improved analytical & forecasting tools – $11.8 million
- Optimize SAV performance - $1.2 million
- Improved reliability of inflow forecasts - $2.1 million
- Total = $45 million

Post-2006 Strategy

- Identification and adaptive implementation of additional water quality improvement measures following completion of pre-2006 projects
  - Implement as soon as their functionality and need is determined
  - Based on ongoing analysis of actual performance and the PDE effort
  - Recommended funding of $36 million

Post-2006 Strategy

- Possible measures for adaptive implementation within proposed budget includes:
  - Conversion of additional lands to SAV, PSTA or other vegetative communities
  - Additional structural and operational modifications within existing STAs
  - Interbasin transfer of water for more integrated and improved operation
  - Integration of water quality improvement strategies into CERP projects
  - Implement more aggressive urban and agricultural source control programs

Post-2006 Strategy

- Implement steps to accelerate recovery of impacted areas
  - Includes final completion of hydropattern restoration works (East WCA-3A, West WCA-3A, and WCA-2A) following a comprehensive benefit/risk assessment
  - Recommended funding of $44.5 million through 2016

Projected Costs

- Long-Term Plan total recommended funding of $444 million through Fiscal Year 2016

Summary

- *Plan* was submitted to FDEP as part of long-term permit application due by December 31, 2003
- *Plan* is being implemented
  - STA Enhancement designs are underway
  - BMP programs are being expanded
  - Research & monitoring are progressing
  - Integration with CERP is happening
- If needed, return to Legislature for 2nd 10-yr phase